



**Northern Subunit C Chromium Investigation
Work Plan
Phoenix-Goodyear Airport (PGA) South Site**

Phoenix-Goodyear Airport South Site
Goodyear, Arizona

The Goodyear Tire & Rubber Company
Akron, OH

By:

TRC

Concord, California

September 2012

The Goodyear Tire & Rubber Company

Akron, Ohio 44316 - 0001

September 26, 2012

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Mr. Travis Barnum
Environmental Project Manager
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007

Subject: Northern Subunit C Chromium Investigation Work Plan
Phoenix-Goodyear Airport (PGA) South Superfund Site, Goodyear, Arizona

Dear Ms. Brown and Mr. Barnum:

The Goodyear Tire and Rubber Company (GTRC) is providing the attached *Northern Subunit C Chromium Investigation Work Plan* for the Phoenix-Goodyear Airport (PGA) South Site, Goodyear Arizona, dated September 26, 2012. This work plan has been prepared to outline the initial phase of delineation of chromium in groundwater within the northern Subunit C aquifer, north of Yuma Road.

The work plan includes borings along one north-south transect located within the Union Pacific Rail Road (UPRR) right-of-way, where access is likely to be straightforward and attainable. A second north-south transect was originally considered to the east of the UPRR right-of-way, on property owned by the Jehovah Witness congregation. However, access negotiations with the congregation have not been successful to date. Therefore, in the interest of timely data collection and evaluation, and to avoid lengthy delays that may result from ongoing negotiations with the congregation, the scope of this work plan includes only the one transect on the UPRR right-of-way.

If you have any questions, please feel free to call me at (330)796-7430.

Sincerely,



Jeff Sussman
Project Manager

Attachment: Northern Subunit C Chromium Investigation Work Plan, Phoenix-Goodyear Airport (PGA) South Superfund Site, Goodyear, Arizona

cc: N. Nesky, A. Gu, D. Fisher, ITSI (electronic copy and hard copy)
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9/26/2012



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Phoenix-Goodyear Airport (PGA) South Site**

September 26, 2012

Phoenix-Goodyear Airport South Site
Goodyear, Arizona

Prepared For:

The Goodyear Tire & Rubber Company
1144 E. Market Street
Akron, OH 44316

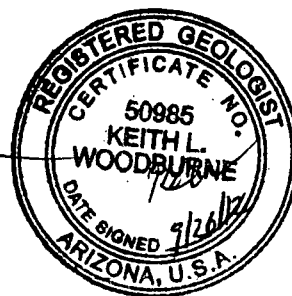
By:

A handwritten signature in cursive script, reading "Rachelle Clair".

Rachelle Clair
Project Geologist

A handwritten signature in cursive script, reading "Keith Woodburne".

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1.0 INTRODUCTION

This *Northern Subunit C Chromium Investigation Work Plan* (work plan) outlines the proposed scope of work to complete a transect-based, depth-discrete groundwater investigation for chromium within the northern Subunit C aquifer by the Goodyear Tire & Rubber Company (GTRC) at the Phoenix-Goodyear Airport South Superfund Site (PGAS or site, Figure 1). The work conducted at the site is carried out under Consent Orders issued by the United States Environmental Protection Agency (USEPA) as part of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Remedial activities at the site are overseen by the USEPA and the Arizona Department of Environmental Quality (ADEQ).

With the recent focus on the northern Subunit C trichloroethene (TCE) and chromium plumes following the 2012 Five Year Review Report (USEPA, 2010), and the forthcoming requirements within a Record of Decision (ROD) amendment or Explanation of Significant Difference (ESD) document to address chromium treatment in northern Subunit C, GTRC has focused recent efforts on understanding the distribution of chromium in groundwater. This work has involved recent and ongoing comparison studies of chromium sampling and analysis methods to better understand the effects of turbidity on the total chromium concentrations reported in groundwater and to gain a clearer understanding of the distribution of chromium in site groundwater. Based on the results of these studies and on the necessity for delineation of chromium in northern Subunit C groundwater in order to determine the most appropriate remedy for treatment, GTRC has prepared this work plan to evaluate the chromium plume distribution down gradient of GMW-13UC.

The work plan describes a transect-based, depth-discrete groundwater investigation of the northern Subunit C aquifer to delineate the lateral and vertical extent of chromium in groundwater downgradient of the presumed source area on the JRC Goodyear property. The investigation will involve the advancement of borings along a proposed north-south transect, oriented nearly orthogonal to the general direction of groundwater flow, and located along the Union Pacific Railroad (UPRR) right-of-way (Figure 2). The borings will be advanced to the total depth of the Subunit C aquifer (approximately 350 feet below grade (fbg)), and depth-discrete groundwater grab samples will be collected from each boring. Following completion of the investigation, the data will be reviewed and a summary technical report will be submitted to the USEPA and the ADEQ within 60 days.

2.0 SITE DESCRIPTION

PGAS comprises an area of 4 square miles and is located approximately 17 miles west of Phoenix, Arizona. The site encompasses the Phoenix-Goodyear Airport (formerly known as the Phoenix-Litchfield Naval Air station), the JRC Goodyear property (formerly owned by Goodyear Aerospace Corporation) and limited properties immediately adjacent to the airport, which are commercial, industrial, and agricultural in nature.

The commercial and industrial properties are located east of the airport and agricultural land is located to the north, south, and west of the airport. The nearest residences are approximately one-half mile west and less than one-quarter mile northeast of the airport. PGAS lies within the City of Goodyear, with the majority of the site located on the Phoenix-Goodyear Airport, which is owned by the City of Phoenix. Projected future land uses on and near the site include an increase in residential and commercial development with a corresponding decrease in agricultural usage.

The regional climate is semi-arid and is characterized by long, hot summers and short, mild winters. Relative humidity is low, particularly during early summer, and rainfall averages approximately 7.5 inches per year. The average daily maximum temperature is 107 degrees Fahrenheit (°F) in July and 62 °F in January. The average median temperature is approximately 72 °F.

2.1 Site History and Use

In 1943, the United States Navy (Navy) established the Litchfield Naval Air Facility (LNAF) in Goodyear, Arizona as an Auxiliary Acceptance Unit that received modified aircrafts from an adjoining plant operated by Goodyear Aerospace Corporation (GAC), Arizona Division. From 1946 to 1968, the LNAF's primary function was the preservation and activation of decommissioned military aircrafts. In 1968, the Navy transferred ownership of the facility to the City of Phoenix, and the facility became the Phoenix-Litchfield Municipal Airport. The airport was renamed the Phoenix-Goodyear Municipal Airport in 1986.

GAC, a former subsidiary of GTRC, began operation at the airport and at the adjoining plant located at 101 South Litchfield Road in 1942. GAC was engaged in modifying, repairing and servicing military aircrafts, and manufacturing aerospace parts and equipment. They operated on the airport until 1968 and at the adjoining property until 1987; this former facility is now owned by JRC Goodyear Company.

During the Navy operations at the Phoenix-Goodyear Airport, the LNAF was used primarily for the preservation and activation of decommissioned military aircraft. The effluent from these processes was discharged into the airport's main drainage ditch. Because the Navy experimented with stripping compounds and protective coatings, the exact chemicals and quantities used at the LNAF is uncertain.

In addition to effluent from the preservation and activation process, waste streams from routine aircraft maintenance, cleaning, and degreasing were also discharged into the main drainage ditch, which eventually drained into a marsh area south of the airport. The discharged waste streams may have contained oil, grease, battery acids, and miscellaneous degreasing solvents. This practice continued until 1952, when the on-site sewage treatment plant, constructed in 1951 to treat domestic sewage, was upgraded to receive and treat industrial waste.

Under GAC, the major operations at the adjoining plant were developing and manufacturing aerospace-related products. During the 1940s, aircrafts from the LNAF were brought into on-site hangars for cleaning, machining and installation of parts. Other operations at the plant included manufacturing and installing machinery and electronic components for the Department of Defense. The majority of the waste streams were attributed to metal treatment processes such as anodizing, degreasing, and etching. These waste streams included waste solvents (e.g., trichloroethene, or TCE), chromium sludge from metal treatment processes, acids, and process wastewater.

Prior to 1980, much of the waste generated from metal treatment was disposed in three on-site sludge drying beds: one large and two small impoundments located at the southern portion of the plant. The large sludge drying bed was used from the early 1970s to 1980. The two smaller sludge drying beds were used from an unknown date until about 1976. The sludge drying beds were the only known sites used for the disposal of waste sludge prior to 1980. Waste solvents of unknown quantity and composition were occasionally disposed of in the two small beds for evaporation.

After this time, effluent wastewater from the GAC plant was discharged through three outfalls into nearby sewers and drainage ditches that eventually drained into the main airport drainage ditch. The discharges were permitted under a National Pollutant Discharge Elimination System (NPDES) permit issued in early 1983.

In 1981, the Arizona Department of Health Services (ADHS) discovered that the groundwater underlying the PGA area was impacted by industrial solvents and chromium. Additional groundwater sampling conducted in 1982 and 1983 by ADHS and the USEPA identified eighteen wells that were contaminated with TCE. Six of the eighteen wells exceeded the ADHS' drinking water action level of 5.0 micrograms per liter ($\mu\text{g/L}$) for TCE. Three of the eighteen wells were being used for drinking water. The PGA site was formally listed on the National Priorities List (NPL) on September 8, 1983, as the Litchfield Airport Superfund Site (USEPA, 2005).

In 1984, the USEPA initiated a Remedial Investigation (RI) of the PGA area to explore the nature and extent of the contamination, and the exposure pathways and receptors of hazardous contaminants. Groundwater sampling data identified two major areas of non-contiguous contamination attributable to different responsible parties. Therefore, the Litchfield Airport Superfund Site was divided into a northern and a southern area; however, the site was not divided administratively, into two sites, so a single Record of Decision (ROD) addresses both sites. The sites do have different Consent Orders and generally operate as two separate Superfund sites. This work plan is limited to PGA South.

2.2 Site Geology and Hydrogeology

PGAS is located in the western part of the Salt River Valley in the Sonoran Desert. The site lies within the Basin and Range physiographic province, consisting of alluvial basins and mountain ranges. The two major surface-water drainages in the vicinity of PGAS are the Gila River located two to three miles to the south, and the Agua Fria River located one to two miles to the east. The Agua Fria River remains dry most of the year and drains south into the perennial Gila River with occasional releases from the Bartlette Dam, storm runoffs from the areas below the dam, and effluent from the 91st Avenue Wastewater Treatment Plant.

The western Salt River Valley is an alluvial sub-basin consisting of unconsolidated to semi-consolidated clastic sediments of the Late Tertiary to Quaternary age, alluvial fan, playa, and fluvial deposits. The alluvial deposits consist of three hydrogeologic units, in descending order: the Upper Alluvial Unit (UAU), the Middle Fine-Grained Unit (MFU), and the Lower Alluvial Unit (LAU). The alluvial deposits generally increase in thickness and decrease in grain-size toward the central areas of the sub-basin (ADWR, 1994). In the vicinity of PGAS, the UAU is approximately 350 feet thick and is further divided into three subunits known as Subunit A, Subunit B and Subunit C. Groundwater flow within Subunits A and C is largely influenced by operations of multiple domestic, municipal, irrigation, and remediation (extraction and injection) wells in the PGA area.

2.2.1 Subunit A

Subunit A forms the uppermost subunit of the UAU and extends from the ground surface to approximately 80 to 130 feet below grade (fbg). The average thickness of Subunit A is approximately 105 feet. Subunit A consists of silty sand and gravel, and is an unconfined aquifer with the lower one-third to one-half of it being saturated. The water table in Subunit A is encountered generally between 60 and 75 fbg, and the saturated thickness of Subunit A generally decreases from north to south with localized variation.

The average hydraulic conductivity of Subunit A was estimated to be approximately 400 gallons per day per square foot (gpd/ft²) or 50 ft/day (USEPA, 1989).

2.2.2 Subunit B

Subunit B forms the middle hydrologic unit of the UAU and is comprised of fluvial sediments with interbedded materials of mostly silt, clay, and silty-sand. Subunit B is considered to be an aquitard between Subunits A and C. The thickness of Subunit B averages approximately 50 to 70 feet. The average hydraulic conductivity is estimated to be approximately 40 gpd/ft² (5 ft/day).

2.2.3 Subunit C

Subunit C forms the lowermost hydraulic unit of the UAU and consists predominantly of medium to coarse sand with some silt. Subunit C typically extends from 190 to 350 fbg with thickness ranging from 130 to 160 feet and more. The upper portion of Subunit C is comprised predominantly of sandy gravel with minor interbeds of fine-grained materials. The lower portion consists of interbeds of sands, clays, and gravels, and is generally finer-grained than the upper half. Subunit C is a highly transmissive, confined aquifer. The average hydraulic conductivities are approximately 1,000 gpd/ft² (130 ft/day) for the upper half and 600 gpd/ft² (80 ft/day) for the lower half (USEPA, 1989). Subunit C is the predominant groundwater source in the PGA area for agricultural, domestic, and municipal uses.

3.0 SITE ASSESSMENT ACTIVITIES

TRC proposes to conduct a transect-based, depth-discrete groundwater investigation to better delineate the extent of chromium in groundwater within the northern Subunit C aquifer along a north-south transect, oriented nearly orthogonal to the general direction of groundwater flow, across the currently understood limits of the northern Subunit C chromium plume footprint. The sequence of borings, and procedures for drilling, sampling, and data collection, are discussed in further detail below.

3.1 Drilling and Sampling Activities

3.1.1 Pre-Field Activities

Prior to beginning field work, Notices of Intent (NOIs) will be obtained from the ADWR for the installation of the borings. In addition, access agreements will be negotiated with the offsite property owners.

Boring locations will be clearly marked with white paint or staked according to Arizona Blue Stake (ABS) requirements. At least two days prior to commencing work, ABS will be notified. The ABS ticket will be maintained as long as work continues at the site, and will be updated as necessary for any boring location adjustments that are made based upon the field constraints. In addition, a private utility locator will be contracted to confirm the absence of buried utilities at each proposed boring location. Prior to drilling each boring, a pilot hole will be advanced using a hand auger to approximately 5 fbg to safely verify the absence of buried utilities.

A site and job specific health and safety plan that promotes personnel safety and preparedness during the planned activities will be prepared prior to project mobilization. On the morning of

the day that the field activities are to commence, a "tailgate" safety meeting will be conducted with all exclusion zone workers to discuss the health and safety issues and concerns related to the specific work.

3.1.2 Chromium Investigation

The investigation will involve advancement of up to five (5) borings comprising the north-south transect shown on Figure 2, located along the UPRR right-of-way. Initially, borings T1-1 through T1-3 will be advanced, with boring T1-1 advanced to a depth sufficient to confirm the base of the Subunit C aquifer, estimated at approximately 350 fbg. The depth-discrete groundwater samples collected from borings T1-1 through T1-3 will be analyzed on a 24-hour turnaround time so the results can be evaluated prior to advancement of subsequent borings.

If chromium is detected in the groundwater samples collected from boring T1-3, boring T1-5 will then be advanced. If chromium is not detected in the groundwater samples from boring T1-5, then boring T1-4 be advanced, in order to tighten the delineation of the chromium impacts along the north-south transect. If however chromium is detected at T1-5, boring T1-4 will not be advanced unless additional depth-discrete groundwater data is necessary to better understand the vertical distribution of chromium between borings T1-3 and T1-5. This step out approach to the investigation will maximize efficiency during the field effort while ensuring that the entire anticipated lateral and vertical dimensions of the chromium groundwater plume are delineated across the full length of the proposed north-south transect.

The borings will be advanced using a sonic drilling rig. Sonic drilling employs the use of high-frequency, resonate energy to advance a core barrel or casing into the subsurface formations. During drilling, the resonant energy is transferred down the drill string to the bit face at various sonic frequencies. Simultaneously rotating the drill string evenly distributes the energy and impact at the bit face. First, a core barrel is advanced into the subsurface. A larger diameter casing is then advanced outside of the core barrel, again using sonic vibrations. The inner core barrel is then retrieved with the soil core sample inside. The soil sample is removed and the inner core barrel is once again advanced into the subsurface via the larger outer casing which serves to hold open the hole. The drilling continues in this manner until the desired total depth is reached. Sonic drilling thus provides a continuous and relatively undisturbed core sample for logging and laboratory submittal, if necessary.

Soil samples will be logged continuously during drilling from cores obtained from the inner core barrel, using the Unified Soil Classification System, ASTM D 2487 and Munsell color charts. In addition, up to seven (7) depth-discrete groundwater samples will be collected for laboratory analysis at the following depths:

- One sample near the base of Subunit A
- One sample near the base of Subunit B
- Up to five samples within Subunit C at approximately 20-foot to 30-foot intervals (intervals based on the thickness of Subunit C determined from the initial boring (T1-1))

Groundwater will be collected by using a device that consists of an internal screen. The internal screen is exposed to the water formation when the exterior casing is opened. The inner barrel and outer casing will be drilled to the desired groundwater sample depth; the inner barrel will then be retrieved from within the outer casing. The groundwater sampling device will then be placed into the outer casing and sonically driven approximately five feet below the depth of the outer casing. At this depth, the device will be opened to allow the formation water in.

The groundwater sample will be collected by placing a submersible pump within the screen, and pumping the groundwater into appropriate sample bottles. If groundwater recharge at a particular target depth is slow, an attempt will be made to collect a groundwater sample by waiting a maximum of one hour for sufficient recharge to occur.

The water samples will be placed in an ice-chilled cooler and transported to an EPA-approved, Arizona state-certified analytical laboratory under proper chain-of-custody protocol for analysis. The depth-discrete groundwater samples will be analyzed for chromium by EPA Method 6010B and VOCs by EPA Method 8260B. The chromium samples will be analyzed both unfiltered and following filtration by the laboratory upon receipt. Turbidity will be measured in the field. Due to the time-sensitive need for results to direct subsequent field decisions regarding boring locations and sample depth, the groundwater samples will be analyzed on a 24-hour turnaround time.

After sampling is completed, borings will be properly sealed with neat cement grout. A tremie pipe will be used to place the grout from the bottom of the boring to grade level in one continuous pour.

Each boring will be surveyed with a handheld GPS unit to accurately locate the borings on maps to be included in the investigation report.

3.2 Field Variances

Variances to the work activities described in this work plan may become necessary, depending on geologic observations, analytical data, and conditions encountered in the field. Any variances that occur will be fully documented and described in the final report.

3.3 Decontamination Procedures

Instruments and equipment will be decontaminated prior to and between groundwater sample depths and boring locations to prevent cross-contamination. A triple-rinse procedure will be used, consisting of a water and soap wash, potable water rinse, and de-ionized water final rinse.

For drilling equipment too large for a triple rinse decontamination process (e.g., drill rods, casing, rig), a pressure washer will be used to clean the equipment. A decontamination area will be set up to containerize the fluids and soils washed off equipment during the decontamination process.

3.4 Waste Disposal

The soil cuttings generated during drilling will be collected in plastic lined roll-off boxes. The soil cuttings will be sampled and profiled for disposal at certified waste treatment/disposal facilities. Following profile acceptance, the soil cuttings will be transported to the Southwest Regional Landfill located in Buckeye, Arizona in accordance with applicable regulations. The miscellaneous produced solid wastes including, paper, plastic, rope and personal protective equipment (e.g., gloves and ear plugs) will be disposed in the dumpster at the Subunit A treatment plant facility. Any wastewater produced will be treated within the Subunit A groundwater treatment system.

4.0 REPORT PREPARATION

Upon completion of field activities and receipt of laboratory analytical reports, a technical report will be prepared that will include boring logs showing lithology and depth-discrete sampling intervals, laboratory analytical results, cross-sections and plume maps as appropriate, and conclusions. The report will be submitted to the USEPA and the ADEQ and within eight weeks of completion of field activities and receipt of all data.

5.0 SCHEDULE

Planned activities will be performed according to the following estimated completion schedule:

- Agency approval of work plan expected within four weeks following submittal
- Obtain access agreement with UPRR by December 2012
- Conduct offsite assessment field activities early first quarter 2013
- Submit summary technical report within 60 days following completion of field activities

6.0 REFERENCES

Arizona Department of Water Resources (ADWR). 1994. *A Regional Groundwater Flow Model of the Salt River Valley - Phase II Phoenix Active Management Area Numerical Model, Calibration and Recommendations Modeling Report No. 8.*, March.

USEPA. 1989. *Remedial Investigation/Feasibility Study*, Phoenix-Goodyear Airport. June 7.

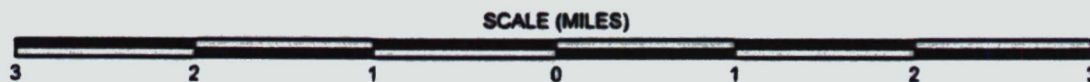
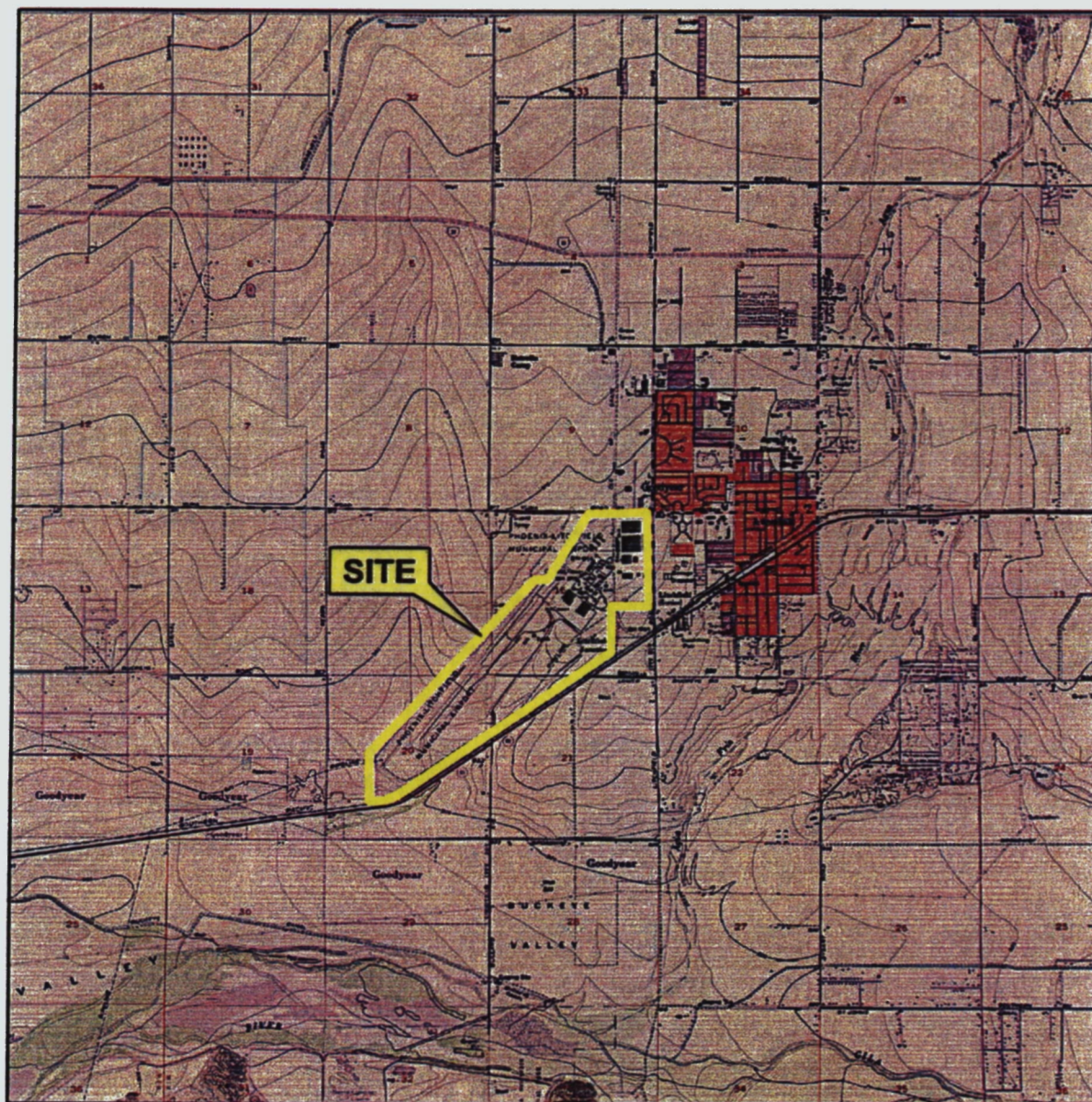
USEPA. 2005. *Five Year Review Report for Phoenix-Goodyear Airport (South) Superfund Site*, Goodyear, Arizona. September.

USEPA. 2010. *Five Year Review Report for Phoenix-Goodyear Airport (South) Superfund Site*, Goodyear, Arizona. September.

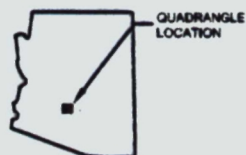


FIGURES

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SOURCE:
United States Geological Survey
7.5 Minute Topographic Maps:
Tolleson Quadrangle, Arizona



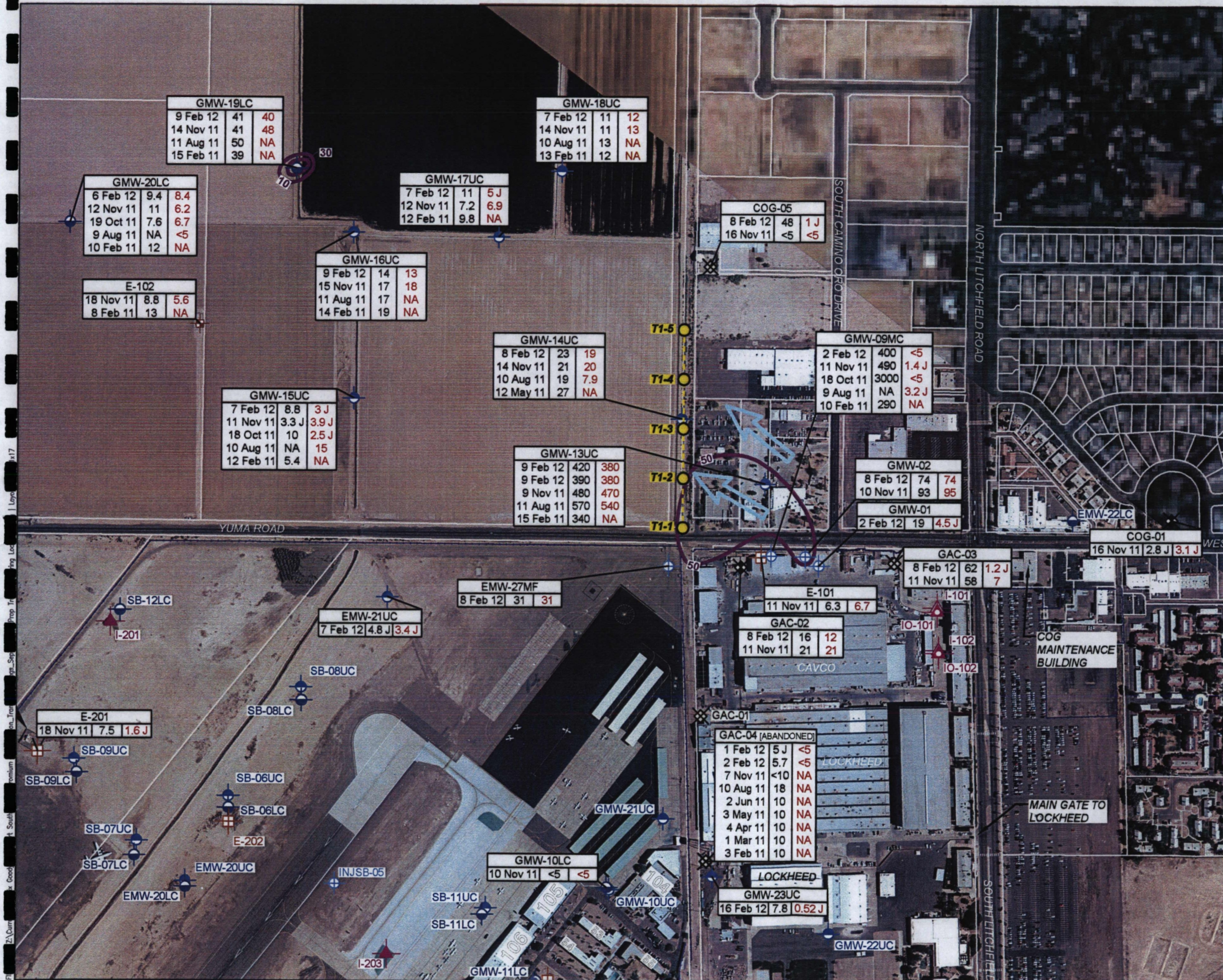
VICINITY MAP

Phoenix Goodyear Airport Site
Goodyear, Arizona



189044

FIGURE 1



LEGEND

- Monitoring well
- Monitoring well: upper zone subunit C
- Monitoring well: lower zone subunit C
- Extraction well - inactive
- Extraction well - in operation
- Injection well - in operation
- Injection well - observation
- Production well - inactive
- Production well - in operation
- Proposed boring

GMW-20LC				Chromium concentration (ug/L)
12 Nov 11	11	6.2		Filtered
				Unfiltered
				Date sampled

- 10 Chromium isoconcentration contour line (ug/L)
- Parcel boundary
- General direction of groundwater gradient

NOTES:

NA = not analyzed.

J = estimated value.

Extraction well E-102 and production wells COG-01, COG-11, GAC-02, and GAC-04 were in operation at the time of sampling. Injection wells I-101, I-102, and I-202 are inactive.

SOURCES: Site plan based on May 2012 aerial photo by Aerial Mapping Company, Inc., and April-May 2012 well surveys by Rick Engineering Company, Registered Land Surveyors.

PROPOSED CHROMIUM INVESTIGATION TRANSECT BORING LOCATIONS

Phoenix Goodyear Airport Site
Goodyear, Arizona